

REMARKS

Claims 1-12 are pending and presented for review. Favorable reconsideration and allowance are requested in light of the remarks which follow.

1. Prior Art Rejections

The Examiner rejects claims 1-12 under 35 U.S.C. § 103(a) as being obvious over U.S. Patent No. 7,171,866 to Fervers ("Fervers") in view of U.S. Patent No. 5,177,386 to Shimada ("Shimada"). Applicant disagrees with the Examiner's rejections, and as such, the rejections are respectfully traversed.

a. Recapitulation of the Invention*

The invention relates to soil compacting devices, and particularly to a vibration exciter for a vibration plate-type soil compacting device. Within the vibration exciter, a magnitude of the total centrifugal force resulting from rotating imbalanced masses is adjusted to be proportional to a travel speed of the soil compacting device, so that the centrifugal forces produced by the imbalanced masses during rotation of the imbalanced shafts are canceled out. Prior art vibration plate-type soil compacting devices use imbalanced shafts to generate vibrations using centrifugal forces of the imbalanced shafts. Each of the imbalanced shafts has a stationary imbalance mass and a movable balance mass. Direction change of such prior art compacting devices is effectuated by moving the movable balance masses to produce an overall centrifugal force that is directed either forward or backward, causing forward or backward movement, respectively. To bring the soil compacting device to a standstill, the movable balance masses are set to create a resultant force in the vertical direction. Correspondingly, the compacting device directs a strong compacting force (a maximum compacting force) to the soil, while the compacting remains at a standstill, which is not always desirable and which can lead to over compacting the soil at that location.

* This Section 1(a) is presented for background purposes so the Examiner may understand the state of the art and, in general terms, the Applicant's contribution thereto. It is not intended to particularly address the traversal of any particular rejection. That task instead is performed in Section 1(b) below.

In the present invention, the positions of the movable imbalance masses in relation to the imbalance shafts that support them are adjusted such that the centrifugal forces produced by the imbalance masses during the rotation of the imbalance shafts cancel each other out as a whole in each rotational position of the imbalance shafts. Thus, while each imbalance mass in itself produces a centrifugal force, the relative positions of the movable imbalance masses are adjusted so that the centrifugal forces generated by rotation of the imbalance masses compensate one another in the overall sum. As such, in this configuration, while operating at a standstill position, it is possible that the vibration exciter produces no vibrations aggregate, although the imbalance shafts are rotating. Stated another way, the movable balance masses are individually adjustable upon their respective supporting imbalance shafts, allowing an establishment of an overall centrifugal force resulting from the imbalance masses that is proportional to a speed of forward or backward motion of the soil compacting device.

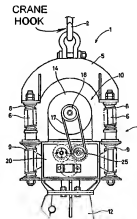
b. Rejections

In the Office Action, the Examiner indicated that Fervers discloses individual adjustment of the movable imbalance masses. Col. 2, lines 50-61. However, as the Examiner acknowledged in the Office Action, Fervers fails to disclose that each of the movable imbalanced masses may be adjusted by the adjustment means such that the centrifugal forces produced thereby cancel one another out. However, the Examiner indicated that Shimada discloses movable imbalanced masses that can be adjusted by an adjustment means such that the centrifugal forces produced cancel each other out for the purpose of eliminating vibrations when the device is at a standstill.

Contrary to the Examiner's assertions, it would not have been obvious to one of ordinary skill in the art to modify Fervers as indicated because Fervers teaches away from such a modification and because only improper hindsight reconstruction of applicant's invention would have led one of ordinary skill in the art to combine the prior art in the manner suggested by the Examiner.

Fervers discloses the adjustment of the positions of imbalanced masses solely for the purpose of selecting amongst a number vibration patterns. *See* Fervers, Col. 2, lines 59-61. No vibration patterns are produced if the imbalanced masses cancel each other out. Stated another way, setting the imbalance masses of Fervers to cancel out the vibrations produced thereby would frustrate Fervers' goal of selecting between one of a number of available vibration patterns.

Only improper hindsight reconstruction of application's own invention would have led one of ordinary skill in the art to combine Shimada and Fervers. Shimada is directed to a vibrating pile driver or a similar stationary device and not to a mobile ground traversing soil compacting device, in which the entire vibrating pile driver device is suspended from a crane during use as shown in Fig. 3 shown below and annotated for your reference. Shimada discloses that "the vibrating pile driver 1 comprises a hanger 5 provided with a sling portion where a hook 2, which is a hanging means adopted by a crane or the like, is hooked." (Col. 5, Lines 1-3). In other words, Shimada discloses that the vibration device thereof must not travel in a forward, backward, or even a traverse motion.



the Shimada patent
FIG. 3 annotated

Shimada sets its imbalanced masses to cancel each other out only for a very device-specific reason not applicable to a vibrating plate machine of the type disclosed by Fervers. Specifically, pile drivers and other large stationary vibrating devices draw tremendous amounts of power particularly at start-up. According to Shimada's text:

Furthermore, in a vibration generator such as this, the driving power required to rotate the eccentric weights at rest at the initial stage of the operation is extremely large as compared with the driving power required to rotate the weights which have once arrived at the rated revolution thereof. Accordingly, if the driving power required to rotate the eccentric weights at rest before bringing them to the rated revolution could be reduced, it should be possible to implement the miniaturization of the driving power source such as a motor, thereby improving significantly the utilization efficiency of energy such as power to be consumed. Therefore, there is a strong demand that a method should be implemented thereby to reduce with ease the driving power required for the revolution of the rotational shafts at the initial stage of the operation.

Col. 1, lines 47-60.

Therefore, at the time of actuating the vibration generator 10, for example, the phase difference between the first and second fixed eccentric weights 51A and 52A and the first and second movable eccentric weights 51B and 52B, which are on the same shaft themselves, are defined as 180 degrees as shown in FIG. 4A, such state becomes the same as in the case of actuating a well-balanced flywheel. Then, the phase difference is gradually reduced from 180 degrees to zero degree by shifting the phase adjustment shaft 23 during the period that the electric motor 14 reaches its rated revolution subsequent to its actuation. Hence it becomes possible to rotate each of the eccentric weights smoothly without a great driving power; thus a smaller electric motor 14 can serve its purpose sufficiently, leading to the implementation of the energy saving.

Coll. 8, lines 33-49.

There is no evidence in the prior art that the relatively small hand operated vibratory compacting plate of Fervers would have been appreciably benefitted by causing the vibrations generated by its imbalance masses to offset each other at startup. Nor is there any indication in the art that the advantage produced by the invention, namely, the ability to selectively not compact soil while a vibratory compacting plate is operating. As such, applicant submits that only improper hindsight reconstruction of applicant's own device would have led a routineer to combine Fervers and Shimada as proposed by the Examiner. A sustainable rejection based on obviousness cannot be supported on such a weak foundation.

Further, Shimada teaches the desirability of configuring its imbalance masses for simultaneous adjustment. Adjusting the masses individually, as in claimed invention, proceeds contrary to the clear teachings of Shimada.

In addition to the foregoing, claim 1 is currently amended to further define it over the prior art cited by the Examiner. In particular, claim 1 has been amended to recite the relative position of the movable imbalance mass with respect to the imbalance shaft, and by proxy the stationary imbalance mass, in order to effectuate a desired direction of movement of the soil compacting device. In particular, to effect forward movement, the movable imbalance masses are rotated 90 degrees relative to the imbalance shaft, to effect a standstill operation the movable imbalance masses are rotated 180 degrees relative to the imbalance shaft, and finally, to effect rearward movement, the movable imbalance masses are rotated in a direction opposite that of the forward direction of rotation and 90 degrees with respect to the imbalance shaft. Neither of the prior art references relied upon by the Examiner in making the rejections discloses or fairly suggests such an arrangement.

New claim 13 has been added to the application. Claim 13 is directed to a method of operating a vibration exciter for a soil compacting device. The method of claim 13 recites an operation requiring that the movable imbalance masses be rotated to positions consistent with those claimed in claim 1. Accordingly, as with claim 1, neither of the prior art references relied upon by the Examiner recite or fairly suggest such an arrangement.


In light of the foregoing, it is submitted that claims 1-13 are in condition for allowance, and a notice to this effect is respectfully requested.

Conclusion

Applicant asserts that claims 1-13 are in compliance with 35 U.S.C. §§ 102, 103, and 112, and each defines patentable subject matter. A Notice of Allowance is therefore respectfully requested.

A fee in the amount of \$1,920 is believed due for the Request for Continued Examination (\$810, large entity) and a three-month extension (\$1,110). No other fees are believed due with this communication. Nevertheless, should the Examiner consider any fees to be payable in conjunction with this or any future communication, the Director is authorized to direct payment of such fees, or credit any overpayment, to Deposit Account No. 50-1170.

Respectfully submitted,



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